

# MATERIAL SAFETY DATA SHEET

**SRM Supplier:** National Institute of Standards and Technology  
Standard Reference Materials Program  
100 Burear Drive, Stop 2320  
Gaithersburg, Maryland 20899-2320

**SRM Number:** 1696a  
**MSDS Number:** 1696a  
**SRM Name:** Sulfur Dioxide in Nitrogen

**Date of Issue:** 18 March 2004

**MSDS Coordinator:** Carmen S. Davis  
**Phone:** (301) 975-6776  
**ChemTrec:** 1-800-424-9300

**FAX:** (301) 926-4751  
**E-mail:** SRMMSDS@nist.gov

---

## SECTION I. MATERIAL IDENTIFICATION

---

**Material Name:** Sulfur Dioxide in Nitrogen

**Description:** SRM 1696a is supplied in a DOT 3AL specification aluminum (6061 alloy) cylinder with a water volume of 6 L. Mixtures are shipped with a nominal pressure exceeding 12.4 MPa (1800 psi) which provides the user with 0.73 m<sup>3</sup> (25.8 ft<sup>3</sup>) of useable mixture. The cylinder conforms to DOT specifications and is equipped with a CGA-660 stainless steel valve.

**Other Designations:** **Sulfur Dioxide** (sulfur dioxide anhydrous; sulfurous acid anhydride; sulfur dioxide; sulfur oxide; fermenticide liquid) in **Nitrogen** (dinitrogen) **Gas Cylinder**

| Name           | Chemical Formula | CAS Registry Number |
|----------------|------------------|---------------------|
| Sulfur Dioxide | SO <sub>2</sub>  | 7446-09-5           |
| Nitrogen       | N <sub>2</sub>   | 7727-37-9           |

**DOT Classification:** Nonflammable Gas (2.2), Compressed Gas N.O.S. (Sulfur Dioxide in Nitrogen), UN1956

---

## SECTION II. HAZARDOUS INGREDIENTS

---

| Hazardous Components | Nominal Concentration | Limits and Toxicity Data  |
|----------------------|-----------------------|---|
| Sulfur Dioxide       | 3500 µmol/mol         | OSHA TWA: 5 mg/m <sup>3</sup>   |
|                      |                       | NIOSH TWA (10 h): 5 mg/m <sup>3</sup>   |
|                      |                       | Human, Continuous Inhalation: TC <sub>LO</sub> : 4.5 mg/m <sup>3</sup> /24 h to 5 d |
|                      |                       | Rat, Inhalation: LC <sub>50</sub> : 2168 mg/m <sup>3</sup>                          |
|                      |                       | Rat, Inhalation: TC <sub>LO</sub> : 30 mg/m <sup>3</sup>                            |
| Nitrogen             | balance               | simple asphyxiant   |

### SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

| Sulfur Dioxide   | Nitrogen  |
|--|---|
| <b>Appearance and Odor:</b> colorless with an irritating odor  | <b>Appearance and Odor:</b> colorless and odorless                                |
| <b>Relative Molecular Mass:</b> 64.06  | <b>Relative Molecular Mass:</b> 28.0134   |
| <b>Specific Gravity (@ -10 °C):</b> 1.434  | <b>Density:</b> 1.2506 g/L  |
| <b>Vapor Density (air = 1):</b> 2.26   | <b>Vapor Density (air = 1):</b> 0.967   |
| <b>Vapor Pressure (21 °C):</b> 2538 mm Hg  | <b>Vapor Pressure (-196 °C):</b> 760 mm Hg  |
| <b>Freezing Point:</b> -73 °C  | <b>Freezing Point:</b> -210 °C  |
| <b>Boiling Point:</b> -10 °C   | <b>Boiling Point:</b> -196 °C   |
| <b>Water Solubility (@ 0 °C):</b> 22.8 %   | <b>Water Solubility (@ 20 °C):</b> 1.6 %  |
| <b>Solvent Solubility:</b> soluble in alcohol, acetic acid, sulfuric acid, ether, chloroform, acetone, aromatic carbides, benzene, liquid camphor, nitrobenzenes, sulfuryl chloride, toluene | <b>Solvent Solubility:</b> soluble in liquid ammonia; slightly soluble in alcohol |

**NOTE:** The physical and chemical data provided are for the pure components. Physical and chemical data for this sulfur dioxide/nitrogen mixture **DO NOT** exist. The actual behavior of the gas may differ from the individual components.

## SECTION IV. FIRE AND EXPLOSION HAZARD DATA

**Flash Point:** Nonflammable

**Autoignition Temperature:** Not Applicable

**Flammability Limits in Air (Volume %):** **UPPER:** Not Applicable  
**LOWER:** Not Applicable

**Unusual Fire and Explosion Hazards:** Cylinders may rupture under fire conditions and due to improper handling. Nitrogen reacts with lithium, magnesium, and neodymium at high temperatures. Mixtures of ozone and nitrogen may be explosive. Titanium is the only element that will burn in nitrogen.

Sulfur dioxide is a negligible fire hazard when exposed to heat and/or flame.

**Extinguishing Media:** Use extinguishing media that is appropriate to the surrounding fire. Sulfur dioxide forms sulfuric acid solution with water.

**Special Fire Procedures:** Fire fighters should wear full protective clothing and self-contained breathing apparatus (SCBA) when this material is involved in a fire. Keep fire cylinders cool with water spray. If possible, stop the product flow.

---

## SECTION V. REACTIVITY DATA

---

**Stability:**          X   **Stable**                             **Unstable**

Stable under normal temperatures and pressure.

**Conditions to Avoid:** Protect cylinders from physical damage. Take precaution to avoid exposing any part of a compressed gas cylinder to temperatures above 50 °C. **DO NOT** store this material in direct sunlight. **DO NOT** store in poorly ventilated areas. This gas corrodes most metals in the presence of moisture.

**Incompatibility (Materials to Avoid):** Nitrogen reacts with metals and oxidizing materials. Sulfur Dioxide is incompatible with combustible metals, metals, bases, oxidizing materials, metal oxides, peroxides, and reducing agents.

See Section IV: "Fire and Explosion Hazard Data".

**Hazardous Decomposition or Byproducts:** Thermal decomposition of both sulfur dioxide and nitrogen will produce oxides of nitrogen. Sulfur dioxide dissolves in water to form corrosive sulfuric acid.

**Hazardous Polymerization**                             **Will Occur**                        X   **Will Not Occur**

---

## SECTION VI. HEALTH HAZARD DATA

---

**Route of Entry:**          X   **Inhalation**                        X   **Skin**                             **Ingestion**

Corrosive, high-pressure gas can cause rapid suffocation. May also cause eye, skin, and upper respiratory tract burns.

**Acute Effects:** The mixture can act as a simple asphyxiant by displacing air necessary for life. It is corrosive and irritating to the upper respiratory tract, skin, and eyes. Inhalation at high concentrations may be fatal due to spasm, inflammation, respiratory paralysis, and edema of the lungs, chemical pneumonitis, and pulmonary edema. Eye contact may result in irritation and inflammation of the conjunctiva and cornea and destruction of the eye tissue.

**Medical Conditions Generally Aggravated by Exposure:** Respiratory disorders are aggravated by sulfur dioxide.

**Listed as a Carcinogen/Potential Carcinogen:**

|  | <b>Yes</b>    | <b>No</b>    |
|--|---------------|--------------|
| In the National Toxicology Program (NTP) Report on Carcinogens       | <u>      </u> | <u>  X  </u> |
| In the International Agency for Research on Cancer (IARC) Monographs | <u>      </u> | <u>  X  </u> |
| By the Occupational Safety and Health Administration (OSHA)          | <u>      </u> | <u>  X  </u> |

### EMERGENCY AND FIRST AID PROCEDURES:

**Skin Contact:** Remove contaminated shoes and clothing. Rinse affected area with copious amounts of water for at least 15 min. Obtain medical assistance if necessary.

**Eye Contact:** Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance if necessary.

**Inhalation:** Immediately remove victim to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration by qualified personnel. Obtain medical assistance if necessary.

**Ingestion:** Not Applicable

**TARGET ORGAN(S) OF ATTACK:** eyes, skin, and upper respiratory tract

---

## SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

---

**Steps to Be Taken in Case Material Is Released or Spilled:** Proper protective equipment should be used (SCBA) in the event of a significant release. Evacuate all personnel, and ventilate the affected area. Stop leak if possible. Remove leaking cylinder to exhaust hood or a safe outdoor area. Remove from any source of heat.

**Waste Disposal:** Try to prevent any direct release of sulfur dioxide to the atmosphere. Dispose of gas at a controlled rate into an adequate amount of alkaline potassium permanganate solution or other alkali. Dispose of nonrefillable cylinders in accordance with federal, state, and local regulations. This cylinder is the property of the purchaser. **DO NOT** return the empty cylinder to the supplier.

**Handling and Storage:** NIST recommends that this cylinder **NOT** be used at pressure below 0.7 MPa (100 psi). Secure cylinders at all times to protect from falling. Use adequate general and local exhaust ventilation to maintain concentrations below exposure limits and to avoid asphyxiation. Use suitable hand truck to move cylinders. Wear safety shoes when handling cylinders. A chemical safety shower and an eyewash station must be readily available. For protection of eyes, wear safety glasses.

**NOTE:** Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Keep valve protection cap on cylinders when not in use. Keep cylinders out of direct sunlight and away from heat sources. Store in cool, dry, well ventilated areas away from combustibles. **DO NOT** allow the area where cylinders are stored to exceed 50 °C. Protect cylinders from physical damage. Compressed gas cylinders are subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Refer to SRM 1696a Certificate for additional usage, handling, and storage information.

---

## SECTION VIII. SOURCE DATA/OTHER COMMENTS

---

**Sources:** Scott Specialty Gases, MSDS *Sulfur Dioxide in Nitrogen*, 3 May 2000.  
MDL Information Systems, Inc., MSDS *Nitrogen*, 19 March 2003.  
MDL Information Systems, Inc., MSDS *Sulfur Dioxide*, 19 March 2003.

**Disclaimer:** Physical and chemical data contained in this MSDS are provided for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given only in the NIST Certificate of Analysis.